Important Advances in Clinical Medicine

Epitomes of Progress—Neurosurgery

The Scientific Board of the California Medical Association presents the following inventory of items of progress in neurosurgery. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist the busy practitioner, student, research worker or scholar to stay abreast of these items of progress in neurosurgery which have recently achieved a substantial degree of authoritative acceptance, whether in his own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Neurosurgery of the California Medical Association and the summaries were prepared under its direction.

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Early Warnings of Intracranial Aneurysms That Bleed

THE MORBIDITY AND MORTALITY from rupture of intracranial aneurysms are of such magnitude that physicians should be alerted to any identifying clues of impending bleeding. Aneurysms in specific loci may have well-described clinical signs before they bleed. Less precise, but of equal import, are other danger signals of imminent bleeding (or, at least, ominous activity) by the aneurysm that should lead to prompt investigation and preventive treatment.

Prominent among these are so-called minor episodes a few days or weeks before a major bleeding event. Called "warning leaks," their true hemorrhagic nature is not necessarily established, but the symptoms demand attention: usually a severe occipital or nuchal pain (occasionally frontal or retro-orbital) with radiation to the vertex or the spine without loss of consciousness but occasionally with vomiting. Recovery is commonly rapid over about 48 hours.

Sixty percent of patients admitted to King and Saba's series with a subarachnoid bleeding episode reported such telltale clues, and 50 percent of Gillingham and Maccabe's patients admitted in stupor or coma were found to have had warning headaches. Fisher also encountered a history of one or more sudden minor headaches occurring in the four weeks before a major attack in about 25 percent of patients with ruptured saccular aneurysms. Of one to several days' duration, some headaches were associated with stiff neck. Clearly, we must consider such warning episodes of unmistakable diagnostic value. Three recent examples in our clinic, two of which were probably avoidable tragedies, underscore the importance of such symptoms.

Although other signs may herald trouble (such as transient ischemic episodes due to emboli from an aneurysm), complaints of cranial pain—severe headache, often worse than anything the patient had previously experienced—should attract the physician's attention.

The pathogenic mechanisms of such sentinel complaints may not be readily proved, but there is indirect evidence that limited leakage of the aneurysm, bleeding into the wall of the aneurysm without extravasation beyond its confines, weakening and tearing or stretching of the wall of the aneurysmal sac may, individually or collectively, be responsible. Not only is spilled blood irritating to pain-sensitive meninges, but the neural innervation of the dura mater and the great vessels from

which aneurysms arise can be stretched and distorted. These mechanisms undergird the painful symptoms of early warnings.

Failure to recognize the significance of such warning clues may jeopardize the patient's prospects for early preventive treatment.

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Neonatal Periventricular-Intraventricular Hemorrhage

NEONATAL periventricular-intraventricular hemorrhage (PV-IVH) occurs within the first 24 to 48 hours after birth in 40 percent to 45 percent of premature infants of gestational age less than 32 weeks and birth weight less than 1,500 grams. The hemorrhage originates in the subependymal germinal matrix near the head of the caudate nucleus due to a number of factors. A disproportionate amount of the cerebral blood flow is directed into an immature capillary bed that lacks autoregulation and is subject to fluctuations in systemic arterial blood pressure and intracranial venous pressure. The gelatinous structure of the subependymal matrix predisposes the area to extension of hemorrhage into the adjacent ventricle and into the cerebral parenchyma. Asphyxia, so common to premature infants, appears to aggravate the tendency toward PV-IVH.

The fulminating clinical deterioration that heralds an acute hemorrhagic episode was well recognized in the past, consisting of sudden apnea, bradycardia, seizures, a bulging fontanelle and extensor posturing, accompanied soon thereafter by hypoxemia, hypotension and acidosis. However, the advent of routine cranial computed tomography (CT) scanning and, more recently, ultrasound screening of premature infants has shown that nearly 50 percent of all episodes of PV-IVH have either a saltatory course or a silent clinical picture. As expected, the subtler clinical pictures are associated both with lesser degrees of hemorrhage and better prognoses.

The short-term and long-term prognoses of infants with PV-IVH are directly related to the severity of the hemorrhage as shown by ultrasound or CT scan. Severe hemorrhages, which usually have a parenchymal hematoma and blood filling the ventricles, result in a 50 percent to 65 percent death rate, progressive hydrocephalus in nearly all the survivors and severe neurologic deficits. Therapy has a limited effect on the outcome. However, mild to moderate hemorrhages, which usually involve a variable amount of intraventricular hematoma, are associated with survival in most of these patients. They still have, however, a 10 percent to 25 percent chance of progressive hydrocephalus. Therapy is directed toward the maintenance of normal oxygenation and acid-base balance and of normal cerebral perfusion pressure by avoiding systemic hypotension or hypertension and by relieving intracranial pressure by ventricular taps or lumbar punctures. Shunting procedures may be required in a small percentage of survivors in whom progressive ventricular dilatation develop despite repeated lumbar-puncture drainage.

Ultimately the best management of neonatal PV-IVH is to prevent its occurrence by developing techniques to avoid premature birth. Until then, rapid diagnosis of a hemorrhagic event by ultrasound or CT scan, treatment that maintains normal cerebral metabolism and perfusion, and detection and treatment of posthemorrhagic hydrocephalus gives the best prognosis for normal development in these unfortunate patients.

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Adult Dementia—Treatable Hydrocephalus?

PROGRESSIVE DEMENTIA accompanying communicating hydrocephalus, at times with a normal or near-normal pressure of the cerebrospinal fluid (CSF), has been identified as a condition that is potentially treatable by a variety of CSF shunting procedures (for example, ventriculoperitoneal shunt) that permit CSF drainage. With this condition there is a gradual progression, typically over weeks or months, of impairment of intellect and memory, along with psychomotor retardation, advancing to a severe dementia, often accompanied by an ataxic or apraxic gait disturbance and urin-